

Alessandro Mapelli

Education

Istituto Universitario di Studi Superiori (IUSS), Pavia

PhD, Biomolecular Sciences and Biotechnology

October 2024 - ongoing

Università degli Studi di Milano

Master of Science, Pharmaceutical Biotechnology (LM-9) 110/110

July 2023

Thesis title: "Investigating the Role of R-Loops and Mitochondrial DNA in the Pathogenesis of Aicardi-Goutières Syndrome"

Supervisor: Prof. Raffaele De Francesco

Co-supervisor: Prof.ssa Anna Kajaste-Rudnitski

Università degli Studi di Milano-Bicocca

Bachelor of Science, Biotechnology (L-2) 101/110

April 2020

Thesis title: "Purificazione e caratterizzazione di una glucoamilasi attiva al freddo"

Supervisor: Prof.ssa Stefania Brocca

Research Experience

San Raffaele Telethon Institute for Gene Therapy (SR-Tiget)

April 2022 - May 2023

Graduate student

Retrovirus-host interactions and innate immunity to gene transfer Unit

- Generated a cell line model of Aicardi-Goutières Syndrome
- Worked on DNA damage and inflammation

During my MSc training period I took part in investigating the molecular mechanisms behind the physiopathology of the Aicardi-Goutières Syndrome (AGS), a rare monogenic encephalopathy characterized by abnormal type I IFN activation in the Central Nervous System. In this context, I generated cell line models of the disease through CRISPR/Cas9-based gene editing, single cell cloning and screening. I characterized the obtained clones for the genetic defect as well as hallmarks of AGS such as spontaneous DNA damage and high type I IFN scores. In addition, I established assays to investigate accumulation of R-loops in these cellular models, observing that both nuclear as well as mitochondrial R-loops accumulate in AGS cells.

San Raffaele Telethon Institute for Gene Therapy (SR-Tiget) May 2023 - January 2024

Research fellow

Retrovirus-host interactions and innate immunity to gene transfer Unit

- Worked on mitochondrial alterations in the context of Aicardi-Goutières Syndrome
- Worked on hiPSC models of CNS cells

In this time as a research fellow, I continued to work on my project dissecting the AGS physiopathology, further addressing the potential contribution of mitochondrial alterations in this disease. For this purpose, I investigated mitochondrial fragmentation and cytosolic release of mtDNA in the cell models of AGS that I generated during my MSc thesis work. I also further investigated the mechanisms behind accumulation of mitochondrial R-loops in AGS cells and established assays to efficiently deplete mtDNA from AGS cells to address its contribution to the activation of the pathological inflammatory signaling. I learned how to culture and differentiate human iPSC into different cells of the central nervous system (CNS) in order to perform similar experiments on hiPSC defective for AGS causing genes in a more clinically relevant context of the human CNS.

University of Pavia, Department of Biology and Biotechnologies February 2024 - September 2024

Research fellow

Laboratory of Molecular Mechanisms of Innate Immunity and Nucleic Acid Sensing

During my period as a research fellow at the University of Pavia, I actively contributed to the establishment of a new laboratory. This experience allowed me to exercise greater independence and gain a deeper understanding of the essential elements required to build and sustain a research laboratory, leveraging the supportive environment of the university.

Additionally, I continued to advance my research on the molecular mechanisms of Aicardi-Goutières Syndrome (AGS), with a specific focus on the molecular sensor responsible for triggering the interferon response in the context of this disease.

University of Pavia, Department of Biology and Biotechnologies October 2024 - ongoing

PhD Student

Laboratory of Molecular Mechanisms of Innate Immunity and Nucleic Acid Sensing

Skills and competences

Cellular culture handling, human iPS cells culture and differentiation, viral vector production, protein Knock-Out and Knock-Down (siRNA), RNA and DNA extraction, SDS-PAGE, Western Blot, PCR, RT-PCR, ddPCR, Flow cytometry, DNA:RNA immunoprecipitation, Immunofluorescence, confocal microscopy.

Data analysis, statistics and representation.

Office package.

Team work, critical thinking, adaptability.

Native Italian speaker. Fluent written and oral English.

Abstracts

Poster Presentations:

Alessandro Mapelli, Ilaria Castiglioni, Julie Tahraoui-Bories, Erika Valeri, Anna Maria Sole Giordano, Anna Kajaste-Rudnitski “Investigating the role of R-loops and mitochondrial alterations in the Aicardi-Goutières Syndrome”. EMBO Workshop on Pathogen immunity and signaling, April 2024, San Servolo (Venice), Italy

Alessandro Mapelli, Ilaria Castiglioni, Julie Tahraoui-Bories, Erika Valeri, Anna Maria Sole Giordano, Anna Kajaste-Rudnitski “Investigating the role of R-loops and mitochondrial alterations in the Aicardi-Goutières Syndrome”. Innate Sensors and Inflammation Meeting, September 2023, Lyon, France.

Alessandro Mapelli, Ilaria Castiglioni, Julie Tahraoui-Bories, Erika Valeri, Anna Maria Sole Giordano, Anna Kajaste-Rudnitski. “Investigating the role of R-loops in the Aicardi-Goutières syndrome”. San Raffaele Scientific Retreat, March 2023, Baveno, Italy.